Hell in a Hand Basket

The Threat of Portable Nuclear Weapons

Charles T. Harrison

Nuclear weapons have been used in armed conflict only twice in our history. However, the threat of nuclear weapon proliferation throughout the world is as real as is the destructive effects of these weapons. The author looks at nuclear devices that can be carried by an individual person. He points out how a nuclear device could be delivered to a target and detonated at a later date. He discusses the difficulty in detecting these devices and offers some possible defenses against their use.

IN THE natural technological evolution of modern artifacts, it is obvious that inventions have become smaller and more powerful. Consider electronic inventions such as computers, televisions and radios. Computers that in the early 1950s occupied several rooms now are reduced in size and space to where they will fit on a desktop or lap. Televisions of the early 1950s were the size of steamship lockers, and some are now smaller than a cigar box. Radios used to be in the old "cathedral" models with separate batteries, and now they can be made smaller than cigarette packs. Automobile engines are smaller and more powerful. Jet aircraft engines have likewise followed suit. The relative compactness of electronic artifacts has been made possible by technological insights such as the transistor and the memory chip. Automobile engines are better designed and turn over much faster in revolutions per minute and have been made possible by imported machining and metallurgical insights. Jet engines run hotter and faster for the same reasons.

Insights into atomic energy are no less significant. There are plenty of parallels in the field of atomic energy. Incredibly, one kilogram of uranium 235 or plutonium has a maximum theoretical yield of 17 kilotons of explosive power, the equivalent of 17,000 tons of TNT. The relative power can be illustrated by World War II bombs of only one ton of TNT, which were called blockbusters because they could destroy an entire city block. Used peacefully, this same kilogram of uranium 235 or plutonium can generate 24 million kilowatt hours of electricity, enough to power a small town for many days.

My study of smaller yield explosives has led to the research on my part of small explosives of nuclear origin. They can be carried by one man in a back pack or, using slightly heavier explosives, the importation into the cities and military bases of any country by civilian automobile. This is a concept that I call a surreptitious importation strike (SIS). This concept's full implications leave one with the eerie, icy fingers of death trampling up and down one's spine. I am sure anyone can see the potential for great harm coming to our country by medium explosive yield nuclear weapons used in an SIS.

The complete ease with which newer nuclear weapons can be driven or carried into soft target areas is very frightening to contemplate. Agents in civilian clothes or in mil-

The views expressed in this article are those of the author and do not purport to reflect the position of the Department of the Army, the Department of Defense or any other government office or agency.—Editor

itary uniforms of an adversary could destroy massive areas with the element of total surprise. The agents would deliver a bomb to a target, set a timer, exit the area, and then the weapons would be detonated. The defenses of the United States and other free world countries—as well as human civilization as a whole—lack any sort of system for defending against an SIS. Our military leaders pursue ever–larger megaton yields from thermonuclear weapons without an apparent thought to the most low–technology, foolproof method for the nuclear destruction of countries.

Military use of nuclear weapons in this manner allows for a very fast importation and exit by saboteurs. The US Department of Energy does have Nuclear Emergency Search Teams (NEST) to deal with civilian criminal nuclear weapons. For many targets, however, the NEST would not have time for multiple searches. Soft military targets such as military installations, defense depots and shipyards, as well as population centers would be easy targets for an SIS. The military could at least expand perimeters of its facilities in times of tensions. A 600–kiloton (kt) weapon in an automobile would require quite a large perimeter (see figure). One man carrying a 20–kt weapon in a knapsack would be very hard to detect and stop. Detection of radiation from nuclear weapons would probably be an impossibility—they are not very radioactive when unarmed, particularly at a distance. It would be possible to make a large effort on the Army's part to inspect vehicles and have computer verification of license plates. This could be done to reduce some of the risks. Even with the best of efforts, however, the SIS is still very potent.

Of course, outfits such as the Army's Rangers and Special Forces and the Navy's Seals used to have nuclear importation forces. The Geneva Convention treats all civilian–clad persons from opposing military forces as spies or saboteurs and denies due process of prisoner of war (POW) status to these civilian-clothed troops. US nuclear weapons designed for these purposes are called special atomic demolition munitions (SADMs). Plans for attacks on an adversary by these weapons fall into the category of "Special Operations."[1]

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SIS weapons do not have the aerodynamic forces on them that missile warheads and aerial bombs do. They do not have to encounter these forces and can be made lighter and with less weight of casing. This is particularly true for artillery shells.

A jacket or casing for a bomb or shell could be eliminated if the explosive were placed 10

Profiles of Nuclear Weapons

Designation	Weight (Pounds)	Length (Inches)	Diameter (Inches)	Yield (Kilotons)	Remarks
Mk 1 Little Boy	8,900	126	28	15	World War II nuclear weapon (Hiroshima)
Mk 3 Fat Man	10,000	128	60	21–23	World War II nuclear weapon (Nagasaki)
Mk 12A	800	71	21	335	Minuteman ICBM warhead
W80–1	290	31	12	150–170	Cruise Missile warhead
W47	600	48	20	600	Submarine–Launched Ballistic Missile warheac
Mk 33	243	37	8	5–10	Modern artillery projectile
W79	215	43	8	10	Modern artillery projectile

to 15 feet underground. Nuclear explosives are detonated by bringing two masses of plutonium or uranium together with chemical explosive blasts. It is important to contain the chemical explosives long enough to allow the nuclear chain reaction to take place. This

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is called the containment potential. Otherwise, the components of modern nuclear weapons are all man portable because of their light weight. Fat man, the Nagasaki bomb, contained only 6.2 kilograms of plutonium.[2] The high explosives (of chemical origin) in modern nuclear warheads may be as light as 15 to 40 pounds.[3] Modern neutron generators such as are used in the W80 cruise missile are about the size of a man's fist.[4]

A sobering thought occurs as we examine the above data. As regards the W47 Polaris missile, we note that its explosive yield is 40 times that of the Hiroshima weapon and 28.5 times that of the Nagasaki weapon. Its size and weight, however, would allow it to fit into the smallest of compact cars. Modern artillery shells are such that they can almost be carried by one man if they were contained in a knapsack. There is a suitcase weapon mentioned as far back in history as the Eisenhower administration.[5]

The difference between the World War II–era weapons and modern weapons is that the former are nuclear weapons and the latter are thermonuclear weapons. Nuclear weapons are based on the fission (splitting apart) of uranium and plutonium atoms. Thermonuclear weapons are based on the joining together (fusion) of hydrogen isotopes (tritium and deuterium). There are modern boosted–fission weapons that are intermediate between the above two mentioned principles. They are the primary subject of this article. As much as 98 percent of the energy of the very powerful thermonuclear weapons comes from fusion, (a fission explosive in the thermonuclear weapon provides heat and compression for the fusion of deuterium and tritium [hydrogen atoms]).

Most people would understand, however, the cost data that reveals how easy it is to graduate from nuclear to thermonuclear weapons. I have seen nothing in the news media reports concerning how developing nations might easily graduate from nuclear to thermonuclear weapons. There is absolutely nothing that prevents a SADM from being a thermonuclear weapon.

There is another sobering analysis of cost data (translate to ease of design and manufacture of thermonuclear weapons) presented in Edward Teller's book *The Constructive Use of Nuclear Explosives*.[6] It was thought some years ago that thermonuclear explosives might be used to excavate canals or blast oil from shale rock. The then Atomic Energy Commission was going to charge licensees in 1964 $350,000 for a 10–kiloton explosive. A 2–megaton explosive cost only $250,000 more, a really frightening bargain when considered in the context of this article.

As previously noted, one ton of TNT was called a blockbuster in World War II because it could destroy a city block. A 2–megaton device, however, will not destroy 2 million city blocks (this destructive principle does not scale up linearly). Essentially, however, a weapon about 100 times the explosive yield of the Nagasaki bomb costs only $250,000 more than the 10–kiloton nuclear explosive that sets off the thermonuclear reaction. As mentioned before, there is no reason whatsoever why the thermonuclear weapon could not be a SADM. From an economic and technical standpoint, such a weapon could be designed to be carried in

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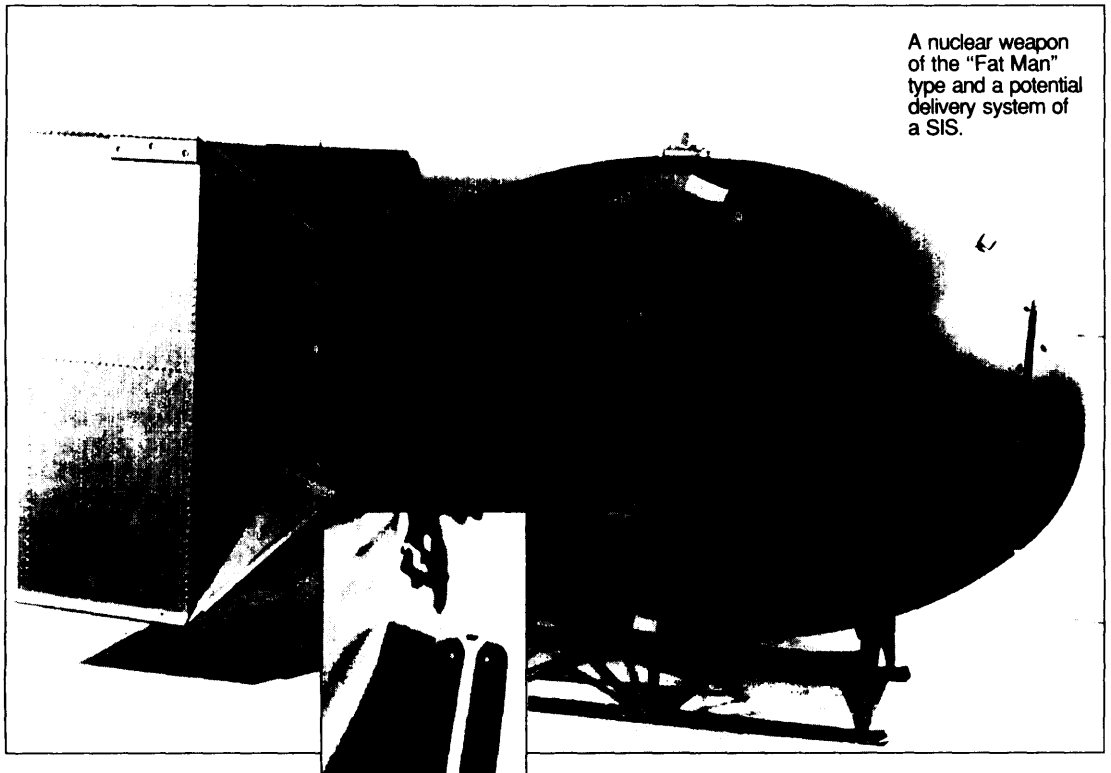

A nuclear weapon of the "Fat Man" type and a potential delivery system of a SIS.

component parts by a small group of men. Obviously, such a weapon could be carried in a small car. Such is the horrible and frightening economics of what Winston Churchill called the "balance of terror." A newspaper article stated that Saddam Hussein of Iraq had been perceived by the UN inspectors assigned to his country to have been developing 220 pounds per year of lithium 6.[7] Horribly, no one in the US government or the media contemplated a thermonuclear weapon in the hands of this despot. There was abundant concern about his possession of a few small nuclear weapons. Gross ignorance prevailed over the lithium 6 news story in light of the fact that any nuclear weapons Hussein had could so very easily be scaled up into multimegaton weapons.

It was suggested by television network military news correspondents that third world nations have not yet been perceived to be building SADMs. This seemed to be a gross underestimation of third world nations and their determination and expertise to build a bomb. On reading this information, many news media military correspondents, members of the Department of Energy and Pentagon officials take the attitude, "So what, SADMs have been around for a long time." SADMs carried by troops were of fractional kiloton yield. It is difficult to convince the

thick bureaucracy that boosted–fission weapons now exist in man–portable models that have yields of tens of kilotons instead of fractional kiloton yield weapons of earlier eras.

William Burgess, in his book *Inside Spetsnaz*, describes Soviet nuclear capabilities of their elite special forces troops, which the Russians call *Spetsnaz*.[8] Burgess states that they rely on surprise and are equipped to handle nuclear weapons as well as biological and chemical weapons. Viktor Suvarov, in his book *Spetsnaz,* states that Russian troops carry 0.8 to 2.0 kiloton weapons.[9] One of these weapons could destroy the White House and the Congress, and another such weapon could destroy the Pentagon in a total surprise attack. Does this tactic relate to the survivable first–strike theories of some Kremlin defense planner? Suvarov states that the *Spetsnaz* troops are so cold–blooded that they will kill their own wounded if it suits operational necessities. There were about 30,000 such troops in the Soviet armed forces.[10]

The nuclear warheads for these delivery vehicles were not destroyed as a result of [the START] agreements. Only a paltry 4 percent of total launch vehicles were eliminated in this cosmetic destruction of launch vehicles. At present many people are giddy with excitement over even larger planned cuts in nuclear weapons. . . . If the plutonium and tritium in these weapons are not accounted for and if the weapons themselves are not destroyed, then the proposed cuts in delivery systems will be a shallow gesture.

In addition to these references, there is also an Associated Press news article of 15 December 1987.[11] In a televised address to his nation, former Soviet President Mikhail Gorbachev stated that if the Strategic Defense Initiative (SDI) was pursued by the United States, then he would respond with asymmetrical means that would be 100 times less expensive than standard Soviet nuclear weapons. The article reads as follows: "Gorbachev made clear at a news conference in Washington Thursday that the Soviet Union still opposed 'Star Wars,' but added that, 'If the Americans have so much money, let them squander it on SDI. We will look for a response along other, asymmetrical lines, that will be less expensive by a hundred times.'" He could only be talking about the *Spetsnaz*. The use of the term asymmetrical is diplomatic jargon for a totally different system than that which would be used by the nuclear forces of the United States. The cost factor mentioned could only be that of an SIS. He stated he would use these inexpensive means and thereby tipped his hand to Soviet SIS nuclear strategy. Even if US defense intelligence reveals that only small tactical nuclear weapons are presently carried by the *Spetsnaz*, then it would be only child's play to equip the *Spetsnaz* with weapons of much higher nuclear yields. These strategic nuclear weapons could be imported by small squads of nonuniformed infantry in component parts and assembled at the target site. In addition, a plan for an SIS nuclear first strike against the United States could be in the minds of high–ranking Soviet military planners. Such a plan could be withheld from Soviet *Spetsnaz* troops until needed. The *Spetsnaz* could then be retrained very quickly, since this outfit now carries the smaller nuclear weapons anyway. The capability for a first strike by exclusive SIS tactics is obvious. Weapons could be delivered clandestinely at different times to targets and all set to explode at the same time in the future. The paratrooper is far from obsolete in today's nuclear war plans.

During the final years of the Reagan administration, Gorbachev agreed to reductions in tactical nuclear weapons in Europe. The Russians made a deal that seemed to their disadvantage in these Strategic Arms Reduction Talks (START) agreements. However, the nuclear warheads for these delivery vehicles were not destroyed as a result of these agreements. Only a paltry 4 percent of total launch vehicles were eliminated in this cosmetic destruction of launch vehicles. At pres-

ent many people are giddy with excitement over even larger planned cuts in nuclear weapons proposed by the Bush and Yeltsin administrations. If the plutonium and tritium in these weapons are not accounted for and if the weapons themselves are not destroyed, then the proposed cuts in delivery systems will be a shallow gesture by both the Commonwealth of Independent States (CIS) and the United States.

In his book, Burgess describes a range of 1,500 kilometers for Soviet deep penetration of an adversary's territory. This limit may be due to the range of airborne supply to the deep penetration forces. The sacrifice of the above–mentioned nuclear weapons delivery vehicles will therefore be of minor importance. If the United States had such forces as the *Spetsnaz,* then the antiballistic missile system protecting Moscow would look as silly and as tragicomic as the US SDI must appear to top CIS political and military leaders.

Other factors affecting the US/CIS military situation are as follows: Is the CIS political system stable and democratic enough to weather a power struggle if Yeltsin is deposed, dies or is politically murdered? Probably not. The multiple reentry vehicles (MRVs) of Soviet intercontinental ballistic missiles (ICBMs) cannot now be verified or inspected (under the terms of the START treaty) to see if more vehicles are there than allowed by treaty limits. What about land–based nuclear weapons for the *Spetsnaz*? Are these weapons definitely unverifiable? Absolutely yes. Could US troops sneak into Moscow as CIS troops could sneak into Washington, D.C., to plant weapons in a surgical strike? Of course. Good relations now exist between the Commonwealth of Independent States and the United States. Do other emerging nuclear nations pose great danger in this technique of nuclear war, as the former Soviet Union did? Obviously. A surgical nuclear strike could be of advantage to Pentagon planners, as such a strike might be a good way to deal with a potential madman leader of the CIS or any other nation. This would present less risk than other actions that could lead to an all–out nuclear war with an emerging third world nation.

The Pentagon suffers from technophilia—the love of technology to the exclusion of reliability and economic factors. This definition is valid even though such high–technology weapons were used successfully in the Gulf War of 1991. The Patriot missile and smart bombs have their place but were not fully tested in a ground war that lasted only 100 hours. What a horrid tragicomedy weapon systems like the SDI are. The B2 bomber, MX missile, Trident submarine and other such costly systems pale by comparison in their destructive potential to an SIS. These modern weapons do not appear very potent with the realization of what an SIS could do. Compare these expensive weapons to just a small fleet of cars with one motivated enemy driver per car. The nation's politicians are content to await a day of nuclear reckoning that could come to pass for the United States, thanks to the *Spetsnaz* or troops of emerging nuclear nations.

The Soviets have published information on how chemical explosive charges may be constructed in specific geometrical shapes to focus the energy of the chemical explosive in much the same manner that a magnifying glass would focus light rays. It was not helpful to the US cause to have these shapes outlined in a very explicit drawing. . . . There is a frightening amount of such information available in open, unclassified scientific literature.

Today's improved US/CIS relations seem to make this sort of threat look less menacing in the era of good feeling. However, third world nations, some of which are not sympathetic to the United States, are rapidly building nuclear arms. Iraq, Pakistan, Libya and Syria are working on nuclear capabilities (Moamar al–Gaddafi's *Islamic Bomb*). There is Argentina (US help to the British during the

Falklands War). South Africa is thought to have several nuclear weapons (friction over racial matters). North Korea is believed to be developing nuclear weapons (issues still relevant concerning the historic Korean War). The recent situation in the Gulf War shows how dangerous things would be if nuclear weapons or nerve gas became the subject of an SIS of the part of Iraq. As relates to all modern warfare, one man could easily carry on his back enough nerve gas to poison an entire municipal water supply. This eventuality might not be so bad if water supplies were routinely tested for chemical and biological agents during times of tension. Iraq has large supplies of nerve gas, as do many third world countries. There has long been concern among military planners of the civilized nations of the world about how easily nerve agents can be made.

The Soviet government published an article in the 1950s that provided in detail the principles necessary to graduate from the possession of atomic weapons of modest yield to the construction of multimegaton strategic nuclear weapons. . . . When one is aware of this cost data and the principles of thermonuclear physics involved, it is easy to see how this horrible "bargain" in destructive power would be quite possible.

The United States and Commonwealth of Independent States might be pulled into a global conflict if an attack was made completely out of the blue against one or another of their respective allies. This could be an entirely anonymous attack against a nation such as Israel, for instance. As more chemical weapons and atomic munitions are developed by third world countries, uncertainty about the identity of a potential saboteur could start a large war. This would be particularly true if the American and Russian people were unaware of potential SIS dangers. The panic and confusion of a potential SIS, the hazards of which no one would be prepared for, are obvious. An SIS anywhere in the world—without making a single blip on defense radar—could trigger an all-out nuclear war that no one planned for. People in a democracy have the right to know all dangers they face. Intelligence gathering about SADMs and the graduation from nuclear to thermonuclear weapons are best done with public knowledge and public political pressure, although the actual intelligence gathering techniques themselves might necessarily remain secret. Continued secrecy about the SIS means the US government is not doing anything about this possibility.

US Armed Forces could prepare by having their own *Spetsnaz*-type troops. This could be as important as the other parts of the defense triad—ICBMs, manned bombers and submarine-launched ballistic missiles. The triad concept is the cornerstone of the US nuclear defense system. If one leg of the triad is knocked out during time of war, then the other two legs would survive to retaliate. With US *Spetsnaz*-type troops, we would have a quadrad, with such troops complementing the other three types of nuclear forces. Potential adversaries' troop uniforms would be made, documents forged, language lessons taught, currency acquired, and so forth, to prepare for a successful importation strike.

At a time when the Soviets had a very closed society, it was amazing that they published such a large amount of material on nuclear weapons' physics development. Both the Soviets and the US Department of Energy have apparently declassified large amounts of material on nuclear weapons. The Soviets are quite proficient in publishing reviews of articles and essays picked up from Western literature on the subject. The US Department of Energy has recently declassified the most intimate details of nuclear weapons construction.

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mented by the cost of nuclear weapons in data that dates from 1964 in Edward Teller's book that was cited earlier in this article. It is well to repeat and reemphasize that a 10–kiloton nuclear weapon in 1964 cost $350,000 to licensed users by the Atomic Energy Commission. A 2–megaton explosive added only the modest amount of $250,000. When one is aware of this cost data and the principles of thermonuclear physics involved, it is easy to see how this horrible "bargain" in destructive power would be quite possible.

The Soviets revealed in the same article how very deadly weapons can be made from the waste of nuclear reactors. They noted that iodine in radioactive form would be quite toxic if delivered in a chemical explosive bomb or an incendiary flare. These weapons are called radiological warfare agents by the Soviets. Most frightening is the creation of long–duration radioactive substances that are bioactive and could poison vast areas with radiological death. Nonetheless, these are bioactive compounds that play a part in human nutrition and would localize in the human body. Many elements formed in a nuclear reactor accident, a radiological warfare agent or a thermonuclear explosive seeded with the correct chemical elements are of a bioactive nature. This means that they would concentrate in the human body's metabolism and not be excreted as would other radioactive substances. This is not to be confused with the neutron bomb of the Carter administration. These are semi–permanent radiological poisons in relation to the transient effects of the potent but short–lived contamination of the neutron bomb. This tactic is despicable and beneath contempt, and terrorists or knowledgeable third world nations could threaten even the superpowers with these weapons.

There have been published Soviet articles related to pure fusion weapons. A thermonuclear weapon requires the generation of heat and compression by a nuclear explosive to set off the fusion of hydrogen atoms (deuterium and tritium). Research in the use of fusion for a clean and very abundant source of electric power could one day provide the insight that could be used to make fusion weapons. As previously noted, the explosive yield of thermonuclear/fusion weapons is in the hundreds of kiloton or multimegaton range.

The Soviets have published information on how chemical explosive charges may be constructed in specific geometrical shapes to focus the energy of the chemical explosive in much the same manner that a magnifying glass would focus light rays. It was not helpful to the US cause to have these shapes outlined in a very explicit drawing. The Soviets have also published materials on the conversion of lithium in nuclear breeder reactors to form rare and expensive tritium, an essential ingredient in thermonuclear reactions. They also diagram the production of heavy water necessary to start a nuclear chain reaction in unenriched uranium.

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There have also been Soviet publications providing data on neutron sources for the initiation of chain reaction fission in uranium or plutonium. A neutron generator provides the neutron "bullets," which fly off the neutron source and strike the nucleus of plutonium or uranium atoms. If a great number of neutron bullets are available to "shoot" into the nuclei of plutonium or uranium atoms, then the critical mass required for a nuclear explosive is greatly reduced. Chain reactions in nuclear/thermonuclear weapons are measured in reference to time as occurring in microseconds. The timing of the burst of neutron bullets in

modern US nuclear weapons is in a fraction of one microsecond. Too early a release of neutron bullets results in predetonation of the fission mass. Too late a release results in inefficient chain reaction fission. The Soviets have very explicitly published cruder but still efficient data on neutron sources. It is the uranium 235 or plutonium that is so expensive and difficult to make by crude third world or terrorist groups. Expensive uranium 235 or plutonium amounts necessary to have a nuclear explosive can be greatly reduced by having an effective neutron source. Graduation from nuclear to thermonuclear weapons is fairly easy once a prolific, well–timed neutron source is found. The Soviets were most helpful to third world nations and terrorists by publishing such data.

Now for a few miscellaneous considerations. Recent revelations about the ease of access to secret data by knowledgeable spies has surfaced in the news. I do not feel any confidence in the leaky US defense establishments regarding the security of state secrets relating to nuclear weapons physics and construction. More important, there is a frightening amount of such information available in open, unclassified scientific literature.

The cost in salaries and employee benefits for many companies of paratroopers is realized in the cost of just one Stealth bomber or a Trident submarine. If the Army should establish SIS divisions of paratroopers, great cost savings could be realized over aircraft and submarines that do an equivalent mission.

The nuclear nonproliferation treaty should be enforced by cooperative action of the US and CIS militaries. Unsupervised electrical generating nuclear reactors, which also breed plutonium as a byproduct, should be destroyed if the respective emerging nation's government will not allow UN inspections. This should include such US allies as Israel and such allies of the former Soviet Union as North Korea.

The lesson of this article is that there is nothing so powerful as an idea whose time has come. It has been pointed out how frightening and dangerous the subjects of this article are. Public ignorance among politicians of the free world is far more dangerous and frightening than any application of nuclear physics. It is time to strip away secrecy surrounding developments in weapon physics so that the public may know what is available to diligent scientists from third world countries. The public education about the dangers we face with uncontrolled nuclear proliferation should be high on the list of politicians and advocacy associations. The public's need to know about the effects of the techniques described above is obvious, although responsible persons should edit out details on the intimate knowledge of the actual techniques themselves. The necessity for public education in a democracy such as the United States is the idea whose time has come. The education about these matters will leave us a sadder but wiser—and safer—nation. ***MR***

NOTES

1. Chuck Hansen, *US Nuclear Weapons: The Secret History* (New York: Orion Books, 1988), 121, 124, 174, 176, 185, 200, 201, 204 and 205.
2. Ibid., 21.
3. Ibid., 32.
4. Ibid., 37.
5. Ibid., 214.
6. Edward Teller, *The Constructive Uses of Nuclear Explosives* (New York: McGraw Hill, 1968), 3.
7. Associated Press, "Iraq Also Worked On Hydrogen Bomb," as appeared in the *Nashville Tennessean*, Nashville, Tennessee, 9 October 1991, 4A.
8. MAJ William H. Burgess, *Inside Spetsnaz: Soviet Special Operations, A Critical Analysis* (Novato, California: Presidio Press, 1990), 6, 7, 221, 226 and 228.
9. Viktor Suvarov, *Spetsnaz, The Inside Story of the Soviet Special Forces* (New York: W. W. Norton and Co., 1987), 98, 136 and 137.
10. Library of Congress, Readiness Subcommittee, United States and Soviet Special Operations (Washington, DC: US Government Printing Office, 1987), 2.
11. Mark J. Porubcansky, "'Star Wars' May Hurt Ties: Gorbachev," Associated Press, New York, printed in the *Nashville Tennessean*, Nashville, Tennessee, 15 December, 1987.

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